papers, the author is not concerned with the whole corpus Catalan published in intermediate journals with less ambitious goals. I would object to this position, which reduces Catalan's work by a good half and has nonnegligible historiographical consequences. This choice, in fact, seems to refute the very purpose of this book, which shows, with much relevant material, the richness and the originality of Catalan's activity and the various activities of a mathematician involved in several different kinds of mathematical production and communication networks. To a greater extent than it does, the biography of such a man, of

Belgium, and other European countries during the 19th century. It is nevertheless a merit of this book that it causes us to wish for such a completion.

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Va Pensiero: Immagini della matematica nell'Italia dell'ottocento. By Umberto Bottazzini. Bologna (Il Mulino). 1994. 328 pp.

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"Fly, thought, on the wings of song..." Bottazzini's title, taken from the most famous song of Verdi's opera *Nabucco*, beautifully encapsulates the theme of these essays on Italian mathematics during the 19th century. For the song itself was spontaneously adopted as the anthem of the movement of independence and Italian unification, a movement in which Italian mathematicians and their mathematics participated fully. The motif is recalled in the "uninflected Latin" epigraph to the eighth chapter, "Simbolismo da alas ad mente de homo" (symbolism gives wings to the mind of man). Both the sentiment and the language in which it is written are due to Peano.

The volume's nine chapters provide a richly textured picture of developments in both the content and the institutional framework of mathematics in Italy from the late 18th to the early 20th century, highlighting both the reception of French and German mathematics by Italians and the formation of the best-known indigenous research schools. While many of the subjects touched on have previously received attention from other historians, Bottazzini's contributions are substantial and important, and the book deserves a wide and attentive audience.

The nine essays here collected have all appeared before, between 1983 and 1991. The original publications were however mostly in thematic collections of articles published in

Italy. They are therefore hard to find (for the most part) and have received little attention in the scholarly press due to the rather summary attention such volumes tend to receive at the hands of reviewing journals. Rather diverse in their length and aims, the papers work well together. Based for the most part on Bottazzini's own research in archival and primary sources, good use is also made of recent Italian scholarship, much of which is little known outside Italy. The introduction is new, and provides useful information about the political activities of various well-known Italian mathematicians.

The papers are arranged in chronological order of the subjects they treat, and fall into several natural groups. The first three chapters deal with the period before unification, concentrating on questions about the metaphysics of the calculus (in particular the reception of Lagrange, Cauchy, and other writers), and on early efforts to forge a national community via scientific meetings in the period before 1848. Chapter Four surveys the origins of the Pisan school, from Betti to Dini, setting the stage for the rest of the book. The remaining chapters, roughly the last half of the book, treat subjects from 1860 onward. In two of these chapters analysis figures prominently, as readers of Bottazzini's *The Higher Calculus* would expect, while the remaining chapters range more widely, looking at the roots of Peano's mathematical logic in the reception of vectorial ideas (notably those of Grassmann) and at the "scientific philosophy" of Enriques.

This list, intended to provide an idea of the main subjects, does not do justice to the variety of topics discussed, nor to the many resonances between the different chapters by virtue of their shared dramatis personae and the relations between the areas of mathematics under discussion. A discussion of the details of mathematical activity is interwoven with contextual concerns. We learn much, for example, about which foreign textbooks were influential on key Italian works, about pedagogical reforms and institutional restructuring, and about research trends. To take one case, the fifth chapter, titled "The Principles of the Calculus and the Logic of Counterexamples," uses as its framework a discussion of Peano's unauthorized publication of a revision of Genocchi's lectures on calculus. However, the chapter situates Genocchi's work as part of a general trend at the time of unification towards publication of one's own lectures. It further traces the shift from the concept of variable to that of function in the two men's work, incorporating an investigation of the influences on both. The actors frequently are allowed to speak for themselves at length (not only in this chapter), and these cited texts are then analyzed for their historically interesting content. Bottazzini also makes remarkably good use of his sources, revealing a wide and detailed knowledge of correspondence (both published and unpublished). Relatively obscure sources, from both inside and outside Italy, are also brought to light in an effort to clarify context. In Chapter Four, for example, we see that Betti, writing on Galois theory, reveals his awareness of remarks in Serret's *Cours d'algèbre supérieure* of 1849.

Rich as it is, the work does not pretend to be a comprehensive history of Italian mathematics during the period in question. It instead points the way to further work in a great many areas, offering as well critical assessments of earlier studies. The author's decision not to revise the essays in order to incorporate historical work appearing in the meantime has not reduced the success of the work as an overview, a series of "images" as the subtitle states. Nevertheless given the antiquity of some of the texts it would have been agreeable to find some mention of recent work, perhaps in an appendix. I was sorry to see only an index of names, though better this than nothing at all.

Reading this fine book was a pleasure. As it seems unlikely that large numbers of non-Italian readers are going to learn Italian in order to read it (despite the considerable collateral benefits), an English translation would be most welcome.

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Germanische Zahlwörter: Sprach- und kulturgeschichtliche Untersuchungen insbesondere zur Zahl 12. By George Schuppener. Leipzig (Leipziger Universitätsverlag). 1996. 178 pp.

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De tous les pouvoirs de la parole, celui de *nommer* les nombres semble être un des plus archaïques: les noms assignés aux nombres dans une langue donnée sont souvent les témoins d'une époque très reculée de l'histoire de cette langue, en même temps qu'ils manifestent une étonnante stabilité à travers les âges. Mais les noms de *nombres* traduisent plus particulièrement notre perception du quantitatif et notre effort pour en exprimer la diversité des formes et en domestiquer l'usage. Faire l'histoire des noms de nombre—en restituer une certaine intelligibilité—c'est d'abord plonger dans la diversité linguistique et culturelle, tâche passionnante, mais ô combien difficile et semée d'embûches!

On saura gré à Georg Schuppener d'avoir soigneusement circonscrit le champ de sa recherche: son domaine linguistique, dans les langues indo-européennes, est celui des langues "germaniques" (allemand, anglais, islandais, danois, suédois, norvégien, . . ., dans leur expression moderne; gotique, vieux norrois, vieux haut-allemand, vieil anglais, . . ., dans leur expression la plus anciennement connue); l'accent étant mis très judicieusement sur une formation très caractéristique de ces langues, celle des noms de nombres "onze" et "douze," et sur la statut particulier du nombre douze qui *semble* associé à ce phénomène linguistique.

La formation particulière eleven/twelve, elf/zwölf, elva/tolv (suédois), . . ., structurellement différente de la formation des noms de nombre de 13 à 19, renvoie, étymologiquement, aux formes anciennement attestées endleofan/twelf (anglo-saxon), ainlif/twalif (gotique), ellefo/tolf (norrois), et se laisse assez facilement interpréter: un (resp. deux) "laissé," sousentendu après le comptage de la dizaine. Une seule langue indo-européenne non germanique offre la même formation pour "onze" et "douze," en l'étendant à tous les nombres de "treize" à "dix-neuf"; il s'agit du lituanien: 11 (wieno-lika), 12 (dvy-lika), 13 (try-lika), 14 (keturio-lika), . . ., 19 (devynio-lika). Il semble bien, dans ce cas, que le lituanien, langue balto-slave de formation récente, ait "emprunté"—le contact des populations étant historiquement avéré—cette formation particulière au germanique.

Mais l'étymologie témoigne, tout au plus, de la permanence d'un phénomène linguistique, elle n'en constitue pas, en soi, un principe d'intelligibilité. Georg Schuppener nous offre, dans une série de chapitres bien construits et bien documentés, un état des recherches sur la question. On appréciera particulièrement la présentation critique qui est faite de la thèse d'un archaïque "comptage par quatre," qui caractériserait le domaine indo-européen dans